



## Influence of climate on malaria transmission depends on daily temperature variation

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### Abstract:

Malaria transmission is strongly influenced by environmental temperature, but the biological drivers remain poorly quantified. Most studies analyzing malaria-temperature relations, including those investigating malaria risk and the possible impacts of climate change, are based solely on mean temperatures and extrapolate from functions determined under unrealistic laboratory conditions. Here, we present empirical evidence to show that, in addition to mean temperatures, daily fluctuations in temperature affect parasite infection, the rate of parasite development, and the essential elements of mosquito biology that combine to determine malaria transmission intensity. In general, we find that, compared with rates at equivalent constant mean temperatures, temperature fluctuation around low mean temperatures acts to speed up rate processes, whereas fluctuation around high mean temperatures acts to slow processes down. At the extremes (conditions representative of the fringes of malaria transmission, where range expansions or contractions will occur), fluctuation makes transmission possible at lower mean temperatures than currently predicted and can potentially block transmission at higher mean temperatures. If we are to optimize control efforts and develop appropriate adaptation or mitigation strategies for future climates, we need to incorporate into predictive models the effects of daily temperature variation and how that variation is altered by climate change.

**Source:** <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2930540>

### Resource Description

#### Early Warning System:

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

#### Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Temperature

**Temperature:** Fluctuations

#### Geographic Feature:

# Climate Change and Human Health Literature Portal



resource focuses on specific type of geography

None or Unspecified

## **Geographic Location:**

resource focuses on specific location

Non-United States

**Non-United States:** Africa

## **Health Impact:**

specification of health effect or disease related to climate change exposure

Infectious Disease

**Infectious Disease:** Vectorborne Disease

**Vectorborne Disease:** Mosquito-borne Disease

**Mosquito-borne Disease:** Malaria

## **Mitigation/Adaptation:**

mitigation or adaptation strategy is a focus of resource

Adaptation

## **Model/Methodology:**

type of model used or methodology development is a focus of resource

Exposure Change Prediction

## **Resource Type:**

format or standard characteristic of resource

Research Article

## **Timescale:**

time period studied

Short-Term (

## **Vulnerability/Impact Assessment:**

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content